of the Amazonas. We saw 2 individuals in Guanabara Bay, Rio de Janeiro, in April 1977. Mainly pelagic, this species is evidently accidental in such southern waters, since it has not been observed again in Rio de Janeiro in subsequent years.

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Mouth size in *Macrodipteryx* and other African nightjars

by H. D. Jackson

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In seeking diagnostic characters for satisfactory identification of the nightjar species of Africa and its islands, I recently (Jackson 1984a) measured various features of a substantial number of nightjar specimens. It soon became apparent that there was little point in measuring the culmen of a nightjar and that a more meaningful measurement would be that of the tomium. Tomium measurements proved to be much less variable than culmen measurements, the coefficient of variability (c. of v.), i.e. the standard deviation as a percentage of the mean (Mayr *et al.* 1953), ranging from only 3.6 to 6.7 for the tomium as opposed to 7.5 to 14.8 for the culmen. The standard bill measurement for nightjars should therefore be tomium rather than culmen.

The measurement of the gape (c. of v. 5.3 to 12.0) also proved to be extremely useful, for the product of these 2 parameters (tomium x gape) provides a rough measure of the overall size of the mouth when wide open, or, in more practical terms, of the area of aerial scoop available for capturing prey. Using the mean measurements in Jackson (1984a) it is immediately apparent that the 2 *Macrodipteryx* species have remarkably small mouths, the tomium x gape product being only 520 and 548 for *M. longipennis* and *M. vexillaria* respectively, while *Caprimulgus donaldsoni*, Africa's smallest nightjar, has a product of 654. The product for *C. tristigma*, which is of a body size comparable to *M. vexillaria*, is 1046 or almost double that of *M. vexillaria*.

Using wing length as a measure of the bird's size, Fig. 1 shows the relative mouth sizes of the 22 species of nightjar known to occur in Africa and its islands. It shows that the *Macrodipteryx* spp. are indeed the smallest mouthed

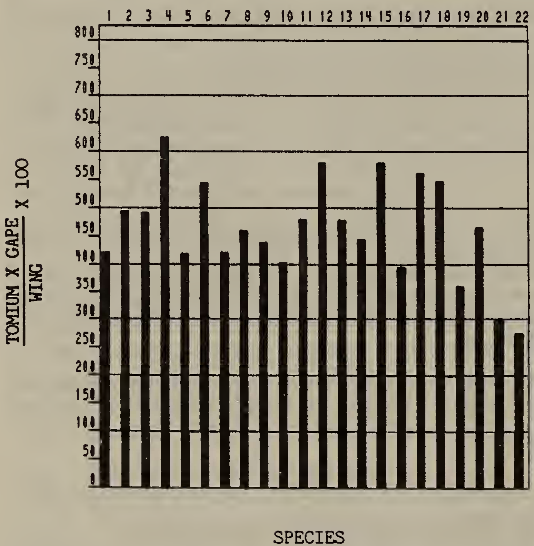

Figure 1. Mouth size (tomium x gape) in relation to wing length (9th primary, numbered from innermost) for the nightjars of Africa and its islands, based on measurements in Jackson (1984a). The species are 1) *Caprimulgus aegyptius*, 2) *C. batesi*, 3) *C. donaldsoni*, 4) *C. enarratus*, 5) *C. europaeus*, 6) *C. eximius*, 7) *C. fossii*, 8) *C. fraenatus*, 9) *C. inornatus*, 10) *C. madagascariensis*, 11) *C. natalensis*, 12) *C. nubicus*, 13) *C. pectoralis*, 14) *C. poliocephalus*, 15) *C. ruficollis*, 16) *C. rufigena*, 17) *C. stellatus*, 18) *C. tristigma*, 19) *Scotornis climacurus*, 20) *Veles binotatus*, 21) *Macrodipteryx longipennis*, 22) *M. vexillaria*.

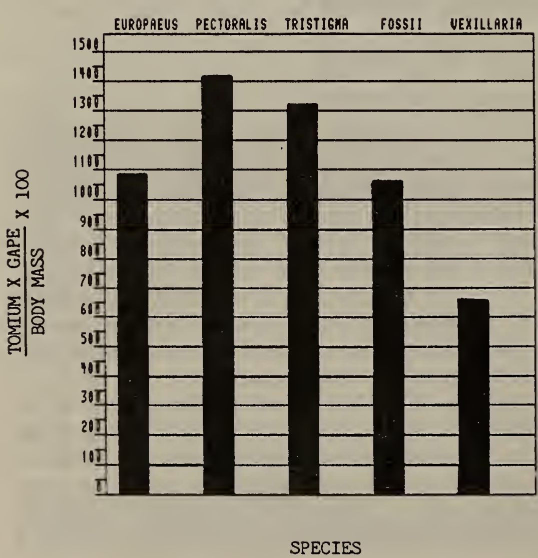

Figure 2. Mouth size (tomium x gape) in relation to body mass for the nightjars of Ranelia Farm, Mutare, Zimbabwe, based on measurements in Jackson (1984a) and weights in Jackson (1984b).

of the lot, while *C. ennaratus* is the largest mouthed. It may be argued that wing length is not a reliable guide to the bird's size, as migrant species tend to have longer wings than resident species, and that body mass would provide a better measure. Weights are unfortunately not available for all the species concerned, but weights for the 5 species occurring in my study area on Ranelia Farm, 50 km south of Mutare, Zimbabwe (Jackson 1984b) are used in Fig. 2, which again emphasises the very small mouth of *M. vexillaria.*

An explanation for these differences in mouth size must be sought in the feeding habits of the species concerned. *M. vexillaria* has a tendency to forage earlier in the evening than most other nightjars. As the light is then better, homing visually onto a target will be more precise and a smaller trap may suffice. However, it would appear that *M. longipennis* does not come out to feed until dusk is advanced (Fry 1969) so this explanation would not fit both species.

While the foraging techniques of African nightjars may vary, one method of prey capture is common to all species; prey is taken on the wing by engulfing it in the open mouth. It is postulated, therefore, that there may be a direct correlation between mouth size and prey size in African nightjars. Stomach contents that I have examined suggest that *M. vexillaria* specialises in termite alates, in contrast to *C. tristigma,* which takes moths and beetles. Chapin (1916) noted the predilection of *M. vexillaria* for termites and argued that "the real cause of their migration . . . may very possibly be traced to their appetite for these particular insects". Many years later, Chapin (1939) again noted the predominance of winged termites in the stomach contents of 18 *M. vexillaria* specimens, and remarked that "While beetles were present in thirteen cases, they were usually few in number and mainly of small size". He also recorded 15 *small* hemiptera, 7 *small* grasshoppers, some winged ants, 4 leaf-hoppers, 2 *small* cicadas, 3 roaches, a *small* mantis, an earwig, and a moth (italics mine) and concluded that "the average dimensions of insects eaten by pennantwings are not great . . .".

Chapin's (1939) examination of *M. longipennis* stomach contents produced similar results: "Eleven out of sixteen stomachs held beetles, often in numbers, while nine stomachs contained *small* hemiptera, equally numerous. The other insects devoured included 11 *small* grasshoppers, 6 moths, 6 winged driver ants, 4 other winged ants, 7 leaf-hoppers, a few *small* Hymenoptera, 2 *small* flies, 2 *small* cicadas, and one earwig. Winged termites filled two stomachs, and one mosquito was seen in a bird's throat, as well as an ant with jaws buried firmly in the flesh". (Italics mine).

It is clear from Chapin's records that the *Macrodipteryx* spp. feed mainly on small insects, as would be expected from my postulate. However, a proper quantitative study is needed on the other species before any conclusions can be drawn. It would be particularly interesting to know what are the feeding habits of *C. enarratus.*

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History, distribution and origin of Barn Owls *Tyto alba* in the Malay Peninsula

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Prior to 1968 the Barn Owl *Tyto alba* was considered an occasional vagrant in the Malay Peninsula, only 4 records being available and of these only 3 can be considered positive. One specimen was taken near Kuala Kangsar, Perak by Kelham in 1881, and 3 from Singapore Island, 1889, 1931 and 1925 (Gibson-Hill 1949 and unpublished information). The 1931 specimen was a purchased skin and therefore of doubtful provenance. The 1925 specimen is in the collection of the British Museum of Natural History, Tring, the other 2 at the Zoology Department Museum, University of Singapore.

In 1968 a pair was discovered roosting in the roof space of an oil palm estate house at Fraser Estate, Kulai (1°40′N, 103°36′E) in the southern state of Johor. The following year, in April 1969, 2 pairs were reported, at the same site, nesting in the roof spaces of 2 adjacent houses (Wells 1972). In February 1970 a Barn Owl was involved in a bird strike with an R.A.F. VC-10 at Changai Airbase, Singapore.

Since then anecdotal reports of Barn Owl sightings and nesting have been increasing, and from 1976 to 1978 these birds were found in oil palm plantations widely throughout the Malay Peninsula with a concentration towards the south and southwest, particularly in Johor State (Lenton 1984).

Present distribution

To ascertain the present distribution of *Tyto alba* in the Malay Peninsula a variety of methods was employed. Questionnaires were sent to all oil palm, rubber and tea estates in the Peninsula and notices and articles were placed in national newspapers and natural science journals requesting information.

Response was limited and biased towards plantation habitats, but by personal follow-up of all replies, further sites were located and over a $2^1/_2$-year period a